DOCUMENTS EXPEDITING PROJECT

86th Congress
1st Session } COMMITTEE PRINT

CANCER: A WORLDWIDE MENACE

SOME FACTS AND FIGURES ON ITS OCCURRENCE IN THE UNITED STATES AND ABROAD

PREPARED FOR THE

COMMITTEE ON GOVERNMENT OPERATIONS
UNITED STATES SENATE

AND ITS

SUBCOMMITTEE ON REORGANIZATION AND INTERNATIONAL ORGANIZATIONS

(PURSUANT TO S. RES. 347, 85TH CONGRESS, AND S. RES. 42, 86TH CONGRESS)

JULY 17, 1959

Printed for the use of the Committee on Government Operations

UNITED STATES
GOVERNMENT PRINTING OFFICE
42414° WASHINGTON : 1959

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington 25, D.C. - Price 40 cents

COMMITTEE ON GOVERNMENT OPERATIONS

JOHN L. McCLELLAN, Arkansas, *Chairman*

HENRY M. JACKSON, Washington
SAM J. ERVIN, JR., North Carolina
HUBERT H. HUMPHREY, Minnesota
ERNEST GRUENING, Alaska
EDMUND S. MUSKIE, Maine
KARL E. MUNDT, South Dakota
CARL T. CURTIS, Nebraska
HOMER E. CAPEHART, Indiana

WALTER L. REYNOLDS, *Chief Clerk and Staff Director*

SUBCOMMITTEE ON REORGANIZATION AND INTERNATIONAL ORGANIZATIONS

HUBERT H. HUMPHREY, Minnesota, *Chairman*

JOHN L. McCLELLAN, Arkansas
ERNEST GRUENING, Alaska
EDMUND S. MUSKIE, Maine
HOMER E. CAPEHART, Indiana
KARL E. MUNDT, South Dakota

JULIUS N. CAHN, *Director of Medical Research Project*

LETTER OF TRANSMITTAL

U.S. SENATE,
July 13, 1959.

Hon. JOHN L. MCCLELLAN,
Chairman, Senate Committee on Government Operations,
U.S. Senate, Washington, D.C.

MY DEAR MR. CHAIRMAN: The subcommittee submits for your consideration the attached summary of information on the worldwide incidence of cancer.

This is the fifth in the series of committee prints presenting data pursuant to Senate Resolution 347, 85th Congress, and Senate Resolution 42, 86th Congress. These resolutions provided—

> for a complete study * * * of any and all matters pertaining to international health research, rehabilitation and assistance programs * * * and * * * the coordination of programs related to international health.

Committee Print No. 1 (S. Rept. 160, 85th Cong.) was entitled, "International Medical Research—A Compilation of Background Materials." It set forth highlights of international research contributions in most of the major fields of disease, in addition to fulfilling other background purposes.

Committee Print No. 2 was entitled, "Statutory Authority for Medical and Other Health-Related Research in the U.S. Government—The Basis for International Cooperation." It contained the texts of the legal authority for medical research efforts by diverse agencies of the U.S. Government.

Committee Print No. 3 (S. Rept. 161, 86th Cong.) was entitled, "The Status of World Health—In Outline Text and Chart." Within it were presented charts on the incidence of certain major diseases throughout the world. It included one chart devoted to the differential rates in the incidence of malignant tumors in various countries of the world.

Committee Print No. 4 was entitled, "The United States and the World Health Organization—Teamwork for Mankind's Well-Being." It represented my personal report on WHO, based upon my conferences with its officials and other authorities in Europe and on subsequent review. One of its phases was a consideration of WHO's role in worldwide cancer research.

The present print constitutes therefore a logical extension in this series, concentrating, as it does, on this disease of deep worldwide significance. It is a disease whose ultimate conquest will undoubtedly involve an unparalleled effort of worldwide biomedical research—the topic which is a prime focus of this subcommittee.

Additional publications in this series will be submitted for your consideration in the period ahead.

With kindest wishes, I am

Sincerely yours,

HUBERT H. HUMPHREY,
Chairman, Subcommittee on Reorganization and International Organizations.

FOREWORD

By Hon. Hubert H. Humphrey, Chairman, Subcommittee on Reorganization and International Organizations

This publication summarizes facts on a disease which is the No. 2 killer in the United States.

Only cardiovascular disease causes more deaths here and elsewhere among the population of the Western World.

Throughout the entire globe, with its population of 2.7 billion, reasonable estimates indicate that over 2 million people die of cancer each year.

This figure is on the rise, paradoxically, as less developed regions approach the health standards and longer lifespans of the Western countries.

What is the nature of this disease?

"Cancer" means crab in Latin. It is an apt word picture for a mysterious transformation which changes disciplined body cells into a malevolent, devouring growth.

THE INCREASING THREAT

Cancer is a disease found in all races and all ages of man, and in all animal species. It was known and described in the earliest medical records.

In the modern world, mankind has fortunately gained increasing control over certain diseases, notably the pestilential infections. By curbing these infectious diseases, mankind has achieved impressive results in prolonging the average lifespan. With the resultant change in the age-distribution of populations and, perhaps, with the onset of factors coinciding with industrialization, cancer has gained ascendancy as man's mortal enemy.

THE PRESENT TOLL OF CANCER

Cancer occurs more frequently at older ages, but no age is free of the disease. In the United States, more children under 5 now die from leukemia and other types of cancer than from all infectious diseases combined. The economic cost of cancer in the United States has been estimated at $12 billion a year. This financial figure cannot fully portray the human tragedy of a lingering disease. At most, only one-half of those afflicted can be salvaged by the maximum utilization of present medical knowledge. At birth, the chances of an American developing cancer in a lifetime are one in five for men and one in four for women. (See question 5.)

The evidence is clear that cancer is a world problem, best solved by research on a world basis. The combined efforts of scientists throughout the world should be applied to developing and exploiting leads wherever they occur.

31 QUESTIONS AND ANSWERS

Some of the possible leads are indicated in the pages which follow. The reader will find herein 31 questions and answers providing highlights of information on cancer within the United States and foreign countries. In each instance of text, table, and chart the expert sources for the data are documented.

THE SUBCOMMITTEE'S FIVEFOLD APPROACH

In its continuing quest for judgment on the overall cancer problem, this subcommittee's approach has been fivefold. It has consisted of:

1. Correspondence and visits with leading American experts, particularly with authorities in the U.S. Government, including Dr. John R. Heller, Director of the National Cancer Institute, and with officers and staff of the Institute. Similarly, the committee has been in touch with cancer specialists, representing the broad spectrum of public and private cancer research centers throughout the United States. This includes, in the latter instance, such renowned institutions as the Sloan-Kettering Institute for Cancer Research.
2. Conferences in Europe with cancer experts, including Prof. Leiv Kreyberg, of the Riks Hospital of Oslo, and Prof. Nicholas Blochin, Director, Institute of Experimental Pathology and Therapy of Cancer, of Moscow.
3. Contacts with other leading members of the International Union Against Cancer, as such. This is the esteemed professional organization which has contributed so much to the worldwide effort against cancer. (See question 30.) Its activities will be described in a later publication by this subcommittee. These contacts with the UICC (as it is known by the initials of its name in French) have included correspondence with individual cancer experts in many nations.
4. Contacts with a wide variety of leaders in the American voluntary organization concerned with the cancer problem, the American Cancer Society. (See question 29.)
5. Contacts with specialized cancer organizations such as professional groups concerned with cytology, surgery, radiation, chemotherapy, and other phases.

LACK OF ESSENTIAL DATA FOR RESEARCHERS

The subcommittee clearly perceives that solution of the problem must come from intensified scientific research. The subcommittee is encouraged by the scientific assault which is being mounted.

Indispensable in that assault is the availability of facts defining the extent of the problem.

But, as cancer experts have reported with regret to the subcommittee, medical science to date has available for its mapping of the fight against cancer only the most sketchy information. Death registry figures which can be considered as adequate by modern standards are published for cancer in only some 20 countries of the Western World. Adequate continuing statistics on the *incidence* of cancer (that is, the occurrence of new cases per year based on a population figure) are

available in but a few smaller European countries, in one State of the United States, Connecticut, and one province of Canada. Yet our best possibilities for the control of cancer and the understanding of its causes lie in studying the distribution of cancer in different populations, and the relations of its occurrence to place, occupation, habits, and other human and environmental traits. More exact information of the distribution of cancer in the world, therefore, is urgently needed.

Accumulation of facts about cancer in human populations is not an easy task. Large numbers of persons must be observed for prolonged periods. Standards for diagnosis must be comparable and firmly based on the laboratory findings of the pathologist. The statistical and medical observations have to be correlated with laboratory observations.

In order to define the problem as closely as the presently available data will permit, the National Cancer Institute was asked by our subcommittee to gather information and charts on the occurrence of cancer in the world and the present status of organized research efforts.

BASIC SOURCES OF DATA

For this purpose, three major sources of data were used: the mortality statistics reported by the National Office of Vital Statistics for this country and by the World Health Organization for other countries; cancer morbidity surveys conducted by the National Cancer Institute, and the State cancer register maintained by the Connecticut State Department of Health.

Some of these facts were previously gathered for professional workers in cancer and published by the Department of Health, Education, and Welfare in 1958 under the title of "The Extent of Cancer Illness in the United States." Information on current developments and studies at an international level are given in the Transactions of the International Society of Geographic Pathology.

INTENDED FOR LAYMEN

This committee print is designed primarily for laymen. To fit our needs it was necessarily assembled rapidly. As indicated above, it does not purport to present new scientific information so far as professional workers are concerned. But it does conveniently bring together, it is hoped, in readable and graphic form certain fundamental data not heretofore generally available to the Congress and to interested laymen.

EXPERT FINDINGS BY OTHER COMMITTEES

The information may provide, therefore a helpful supplement to the comprehensive body of knowledge previously assembled by other congressional committees. In the instance of the U.S. Senate, these expert groups are the Committee on Labor and Public Welfare and the Subcommittee for the Department of Health, Education, and Welfare, of the Committee on Appropriations. Senator Lister Hill is the distinguished chairman of both of these groups.

Interested readers are invited to review the broad varieties of information published in this and previous years by these committees and by authoritative sources in the House of Representatives which have jurisdiction in this field.

This particular publication may, therefore, serve as but one small link in a lengthy chain of publications and events which may, at some date in time to come, contribute to the answers for the disease of cancer.

ONE CONCLUSION IN THIS PUBLICATION

Let it be noted that it is not the purpose of the present committee print to present a definitive set of conclusions on the worldwide battle against cancer. One finding is, however, so apparent that it should be explicitly reiterated. It concerns the indispensable need for additional facts of the type set forth in this report.

This was a general conclusion earlier indicated on page VIII of the foreword to the committee's third print, entitled "The Status of World Health."

It cannot be too strongly restated that full medical understanding of the cancer problem, like understanding of other major disease problems, can only be secured if there are, at the minimum, more facts available such as related to worldwide incidence. This increased body of knowledge from all over the globe must be scientifically reliable, must be still more uniform in character, and more complete in scope and in depth, especially in emerging regions where reporting is thus far extremely limited.

Over and over again, in messages received from cancer experts all over the world, particularly in those regions, the subcommittee has received the well-justified plea for more resources for epidemiological and related studies on cancer.

The availability of at least the type of information in this committee print represents an asset in the fight against cancer. But the unavailability of so much relevant information, the existence of so many unavoidable gaps in this report, represents an important debit. Every expert is aware of this deficiency and seeks to remedy it to the extent resources are currently available.

APPRECIATION TO NATIONAL CANCER INSTITUTE

In turning to the National Cancer Institute for the compilation of this information, the subcommittee logically sought the assistance of the competent organization which is world renowned as the leading single institution in the international effort against cancer.

Appreciation is herewith expressed to Dr. Heller for the exemplary cooperation which has characterized his work and that of his staff, not only on this, but on numerous other phases of the subcommittee's interest, just as it has characterized assistance from the National Institutes of Health in general.

This publication provided as well a welcome opportunity to renew contact with the Public Health Service officer who had served the subcommittee and accompanied me in much of the trip which I had made throughout Western Europe and the Soviet Union, in November–December 1958, Dr. Michael B. Shimkin, Chief of the Biometry Branch of the Institute. Particular credit is expressed to Mr. William Haenszel and Mr. Tavia Gordon, of the Biometry Branch, for the collation of this material, in collaboration with the subcommittee's project director.

CONCLUSION

In conclusion, mankind looks to science and, in particular, to biomedical research to unlock the riddles represented in the pages which follow.

Thus, we ask—why should cancer apparently strike various populations in differing sites of the body and with differing rates, as compared on a country-to-country basis? What clues will the solution to this and related questions provide?

No one should underestimate the value of a single reliable clue. Medical history has very often witnessed major breakthroughs in understanding, thanks to compilation of clues based on reliable facts as to why a particular disease struck a particular group in a particular way.

The world awaits the answers. Of course, medical research provides no easy guarantee and no predetermined timetable of possible success. But with skill, resources, and perseverance, it does provide the only logical hope.

Against a universal killer, mankind must offer a universal defender—scientific cooperation. Against an enemy which strikes irrespective of politics or ideology, mankind must strengthen teamwork in a manner which transcends these or other factors.

At stake is triumph in a human adventure of highest drama. And with triumph, will come the prize of a lessening of human suffering and of premature death throughout the world.

42414°—59——2

CONTENTS

	Page
Letter of transmittal	III
Foreword	V

QUESTIONS AND ANSWERS

1. What is cancer?	1
2. How important is cancer as a cause of death?	2
3. Is the frequency of cancer increasing?	3
4. Will cancer become more common in the future?	4
5. What is the probability that a person will develop cancer?	5
6. How does cancer mortality in different countries compare?	7
7. How does the occurrence of cancer vary with age and sex?	8
8. How does the occurrence of cancer vary by specific site?	9
9. Has the frequency of occurrence of cancer changed for specific sites?	10
10. Are there geographic differences in cancer occurrence within the United States?	11
11. What is known about the occurrence of stomach cancer in different countries?	14
12. What is known about the occurrence of lung cancer in different countries?	16
13. What is known about the occurrence of breast cancer in different countries?	18
14. What is known about the occurrence of uterine cancer in different countries?	20
15. What is known about the occurrence of liver cancer in different countries?	22
16. Are there race differences in cancer occurrences?	24
17. What are some unusual features of cancer mortality among specific groups in the United States of varying origin?	25
18. How does the occurrence of cancer vary with genetic factors?	26
19. Are there urban-rural differences in the occurrence of cancer?	26
20. Does cancer occurrence vary by income?	27
21. What cancers are known to arise from special habits or customs?	28
22. What occupational exposures are known to cause cancer?	30
23. What are the methods for treating cancer?	31
24. What are the survival prospects for cancer patients?	32
25. Have survival prospects for cancer patients improved in this country?	33
26. What is the economic cost of cancer?	34
27. What are the prospects of reducing the toll from cancer?	34
28. What do scientists generally regard as the most important elements of an integrated program of cancer research?	34
29. What are the resources available for supporting the fight against cancer in the United States?	36
30. What are the present international resources for the study of cancer?	38
31. What areas of cancer research lend themselves particularly to an international approach?	40

CANCER: A WORLDWIDE MENACE

SOME FACTS AND FIGURES ON ITS OCCURRENCE IN THE UNITED STATES AND ABROAD

1. What is cancer?

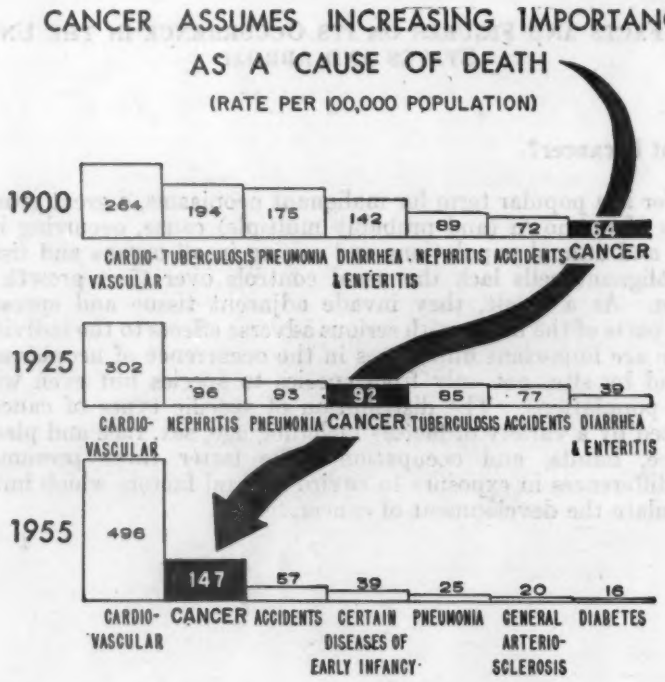
Cancer is a popular term for malignant neoplasms, a great group of diseases of unknown (and probably multiple) cause, occurring in all human and animal populations and arising in all organs and tissues. The malignant cells lack the usual controls over their growth and function. As a result, they invade adjacent tissue and spread to distant parts of the body, with serious adverse effects to the individual.

There are important differences in the occurrence of neoplasms by type and by site, not only from species to species but even within human populations. The distribution of specific types of cancer is influenced by a variety of factors including age, sex, race and place of residence, habits, and occupation. The latter three presumably reflect differences in exposure to environmental factors which initiate or stimulate the development of cancer.

2. How important is cancer as a cause of death?

In most countries having reliable death figures, cancer is now the second leading cause of death. This is true for the United States, Canada, most of Europe, Australia, and New Zealand. It is apparently also true for the U.S.S.R. The figure shows the increasing importance of cancer as a cause of death in the United States between 1900 and 1955.

For countries with less reliable statistics, the infectious diseases normally account for a high proportion of the deaths. However, autopsy information from some of these countries indicates an unusual amount of cancer for certain specific sites—always of great interest to investigators. (Source: WHO; Annual Epidemiological and Vital Statistics Report, 1954.)



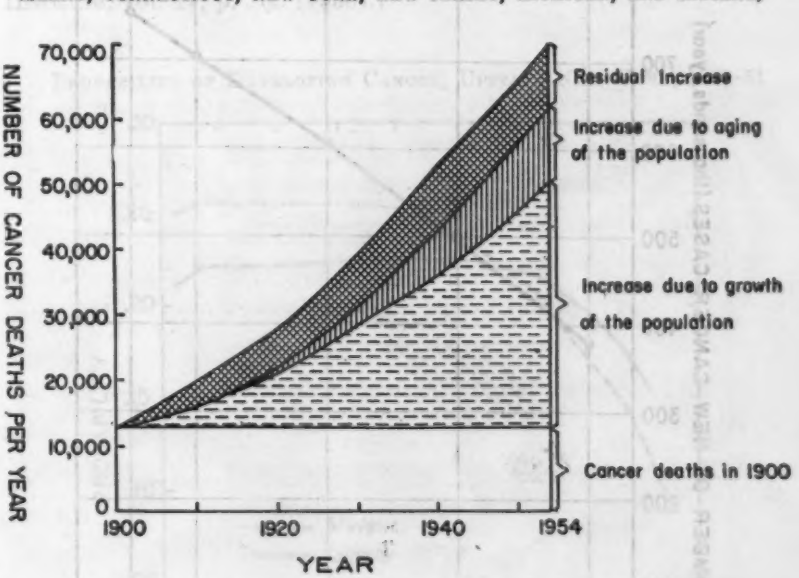
3. Is the frequency of cancer increasing?

In those countries with a long series of fairly reliable death figures, the number of cancer deaths has shown an increase. In most instances it is moot whether any part of this represents a real increase in the risk of dying from cancer. Part of it reflects increasing populations. Part reflects the conquest of communicable diseases, which has allowed a larger proportion of people to survive to older ages, where cancer is more common. Part reflects an increasing awareness of cancer and improving diagnosis.

For two countries, at least, the United States and England and Wales, many informed observers feel that there has been a real increase in the risk of dying from cancer. (Source: WHO; Epidemiological and Vital Statistics Report, vol. 5, pp. 1–144, 1952.)

FACTORS ACCOUNTING FOR THE INCREASING NUMBER OF CANCER DEATHS, ORIGINAL DEATH REGISTRATION STATES, UNITED STATES, 1900–1954

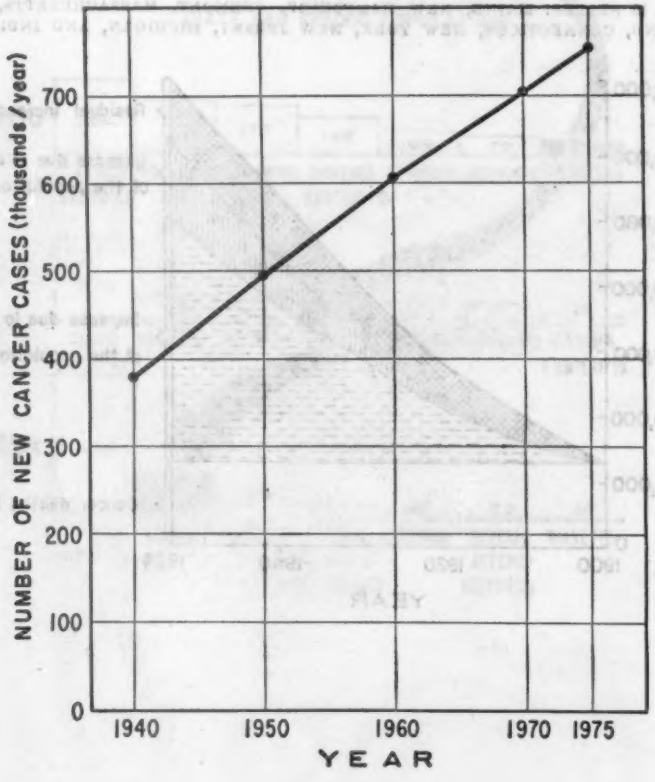
(THE DEATH REGISTRATION AREA OF 1900 INCLUDED THE DISTRICT OF COLUMBIA AND 10 STATES: MAINE, NEW HAMPSHIRE, VERMONT, MASSACHUSETTS, RHODE ISLAND, CONNECTICUT, NEW YORK, NEW JERSEY, MICHIGAN, AND INDIANA)



4. Will cancer become more common in the future?

Unless there are fundamental changes in the risks of developing cancer and dying from it, the growth of the population and the increasing proportion of older persons will result in an increasing number of cancer cases and cancer deaths. Thus, when the population of the United States reaches 200 million—in 1975, by conservative estimates—there will be more than a million cancer cases under treatment and 325,000 people will die each year from cancer. Should the risk from lung cancer continue to rise in this country (and the trends for other countries suggest that it will) these estimates will, in fact, prove to be too low. (Source: Cutler, S. J., and Haenszel, W. M., "The Magnitude of the Cancer Problem," Public Health Reports, vol. 69, pp. 333–339 (1954).)

ESTIMATED NUMBER OF NEW CANCER CASES EACH YEAR, UNITED STATES, 1940–75



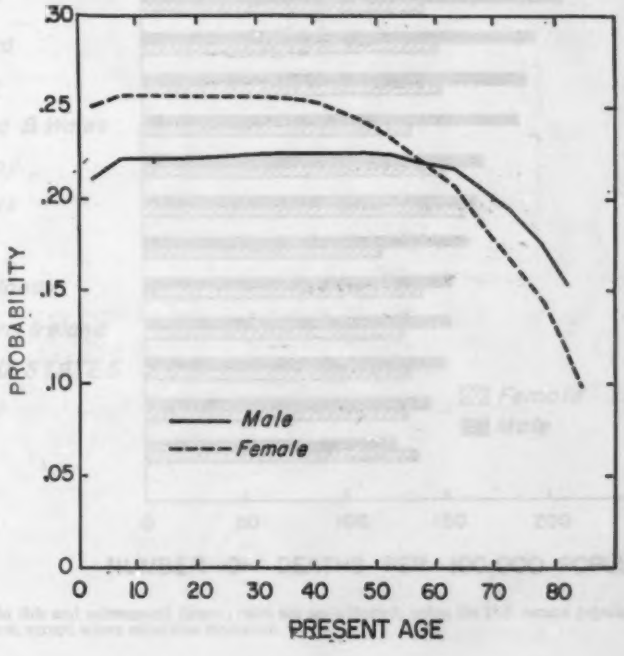
5. What is the probability that a person will develop cancer?

At birth the chances of developing cancer in a lifetime are one in five for men and one in four for women. These estimates are based on experience from New York State and assume that both cancer incidence and mortality from other causes remain fixed at their present level.

The chances of developing cancer vary with age. They are, for example, greater at age 20 than at birth. At older ages, however, the competition of other chronic diseases begins to be felt and by age 65 the chances of developing cancer in the lifetime remaining are less than they were at birth.

The chances of developing cancer also vary by site. For men, the lifetime probability of developing cancer is greatest for the skin and prostate. For women it is greatest for the breast and large intestine. Of all the sites, the breast in women is the one for which the lifetime probability of developing cancer is greatest. (Source: Goldberg, I. D., Levin, M. L., Gerhardt, P. R., Handy, V. H. and Cashman, R. E. "The Probability of Developing Cancer," Journal National Cancer Institute, vol. 17, p. 163 (1956).)

PROBABILITY OF DEVELOPING CANCER, UPSTATE NEW YORK, 1949–51



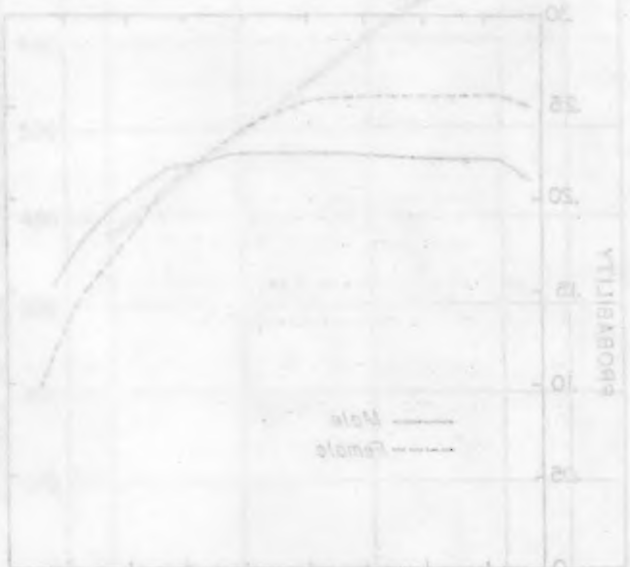
42414°—59——3

The Lifetime Probability of Developing Cancer

THE 6 MOST COMMON SITES BY SEX

[New York State, exclusive of New York City, 1949-51]

Male		Female	
Site	Probability	Site	Probability
	Percent		*Percent*
All sites	21.6	All sites	25.0
Skin	3.0	Breast	5.5
Prostate	2.6	Large intestine	2.7
Lung and bronchus	2.1	Skin	2.5
Stomach	2.0	Cervix	2.3
Large intestine	1.9	Fundus uteri	1.6
Rectum	1.2	Stomach	1.3

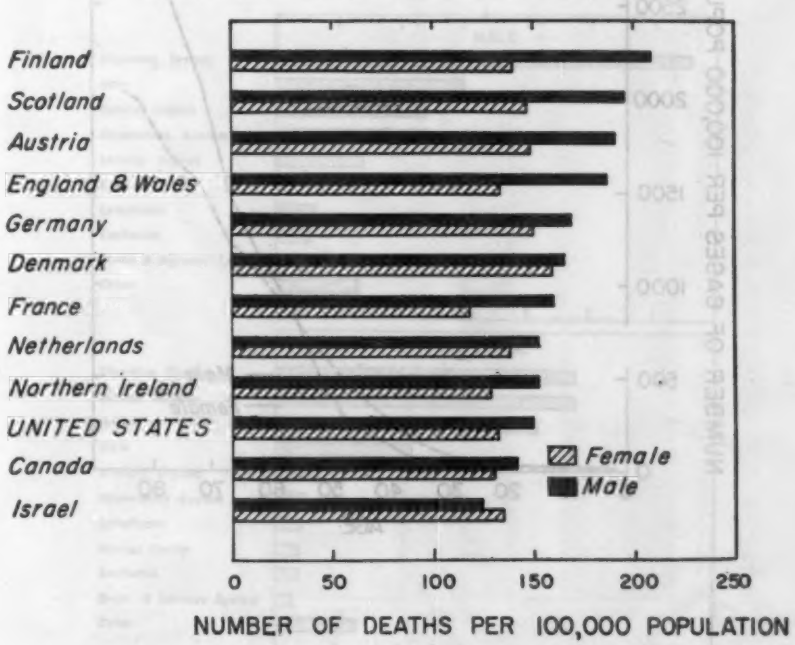


6. How does cancer mortality in different countries compare?

The data available from Western Europe, Canada, Australia, and New Zealand indicate that cancer incidence and mortality in these areas are of the same order of magnitude as for the United States. Within this area of general agreement some differences exist. For men, the United States is near the lower end of the scale of cancer mortality among Western countries, while Finland and Scotland are near the upper end. For women, the disparity in rates among different countries is smaller and the United States occupies an intermediate position on the scale.

For most other areas of the world, the available statistics do not allow a precise judgment. However, it can be assumed that in most of Asia and Latin America, the risk of developing cancer or dying from it is less, since high mortality from other causes of death—particularly in the early part of life—leaves a smaller proportion of the population exposed to the risk of developing cancer. (Source: WHO; Epidemiological and Vital Statistics Report vol. 6, No. 12, December (1953).)

CANCER MORTALITY, SPECIFIED COUNTRIES, 1952



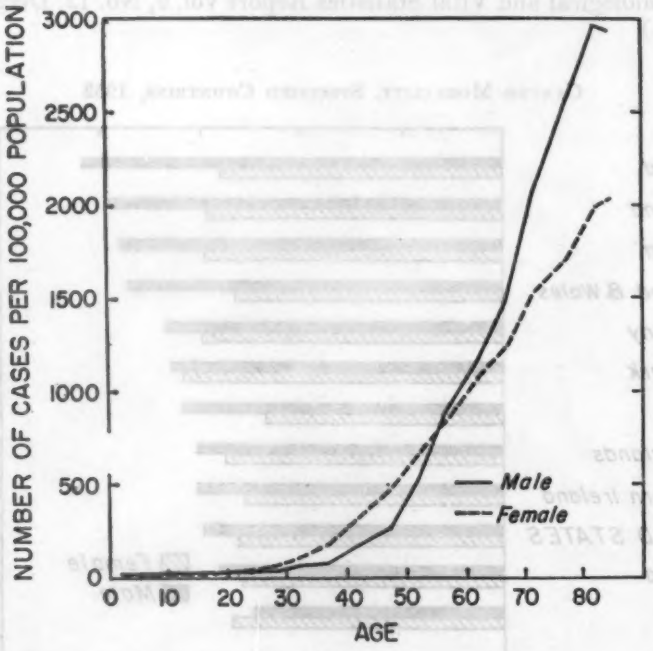
NOTE.—In this and subsequent figures, rates are age-adjusted, using the U.S. census population of 1950 as a standard, except where otherwise indicated.

7. How does the occurrence of cancer vary with age and sex?

Cancer incidence rates continue to rise to the end of the lifespan for both males and females. Between the ages of 20 and 55 the high incidence of cancers of the breast and reproductive system leads to a higher overall incidence of cancer among women than among men. At older ages the rates are higher for men than women, the excess becoming more marked with increasing age.

While these data are from U.S. experience, available evidence indicates that they are typical of experience in human populations generally. (Source: Dorn, H. F., and Cutler, S. J., "Morbidity From Cancer in the United States," Public Health Monograph No. 56, (1959).)

CANCER INCIDENCE RATES BY AGE AND SEX, 10 URBAN AREAS, UNITED STATES, 1947

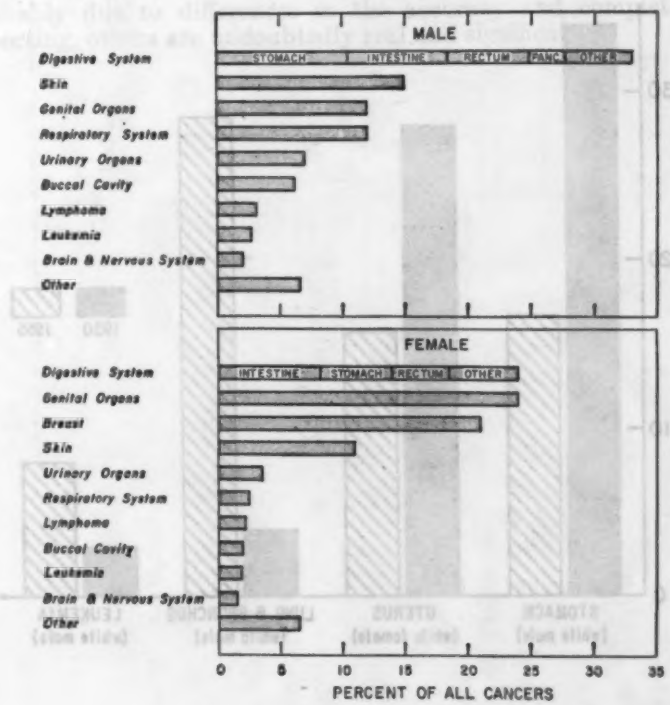


8. How does the occurrence of cancer vary by specific site?

If major site groups are ranked by level of cancer incidence, the digestive system is found to account for the largest number of cases of newly diagnosed cancer for either sex. The skin, genital organs, and respiratory system ranked next in incidence, in that order, for men; whereas for women the order of rank after the digestive system is genital organs, breast, and skin.

Ranking site groups by mortality rather than incidence leads to a similar order, except that skin cancer, which accounts for a large proportion of cases, is a relatively minor cause of death. If mortality for specific sites, rather than for major site groups, is considered, the leading sites for men were lung, stomach, and prostate, in that order, while for women the leading cancer sites were breast, large intestine, and uterus. (Sources: Incidence data are from Dorn, H. F., and Cutler, S. J., op. cit. Mortality data for the United States are published in the annual volumes of Vital Statistics of the United States.)

DISTRIBUTION OF NEW CANCER CASES BY SITE, 10 URBAN AREAS, UNITED STATES, 1947



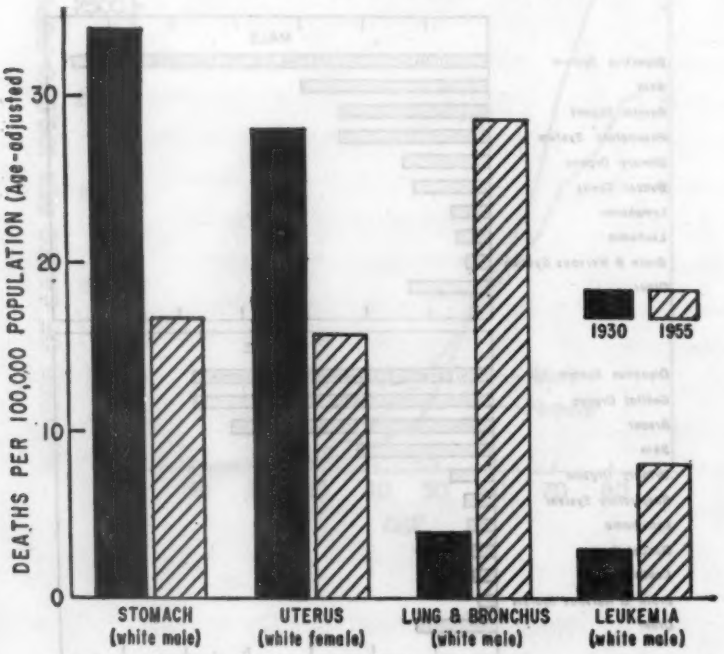
9. Has the frequency of occurrence of cancer changed for specific sites?

While a number of minor changes in the occurrence of cancer are suggested by reported statistics for the United States, four changes are especially noteworthy.

There has been a large increase in the incidence and mortality for lung cancer among men. Between 1930 and 1955 mortality for this cause increased more than sevenfold, and indications are that it will rise even more. During the same period the reported mortality for leukemia more than doubled.

At the same time, mortality for cancer of the uterus decreased by half, but without a comparable change in incidence. Presumably this reflects an increasing chance of survival from this type of cancer, perhaps in response to earlier diagnosis and improved treatment. A decrease has occurred in mortality for stomach cancer, apparently resulting from a decreasing incidence of cancer of this site.

CHANGES IN MORTALITY FOR STOMACH CANCER, LEUKEMIA, LUNG CANCER, AND UTERINE CANCER, UNITED STATES, 1930–55

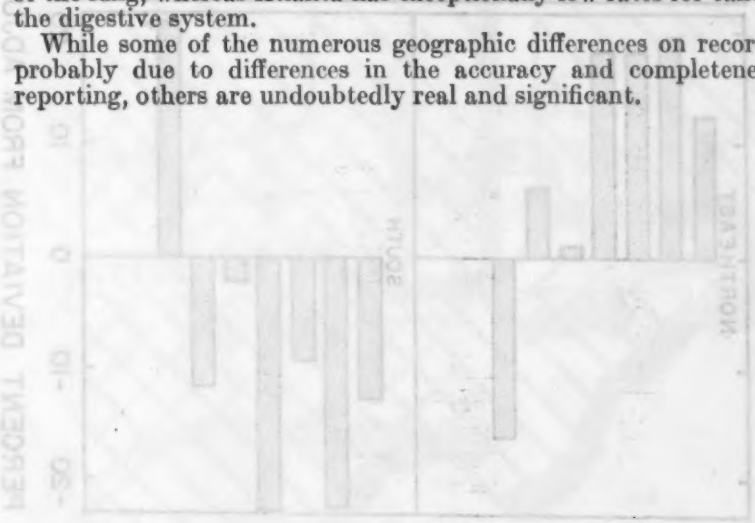


10. Are there geographic differences in cancer occurrence within the United States?

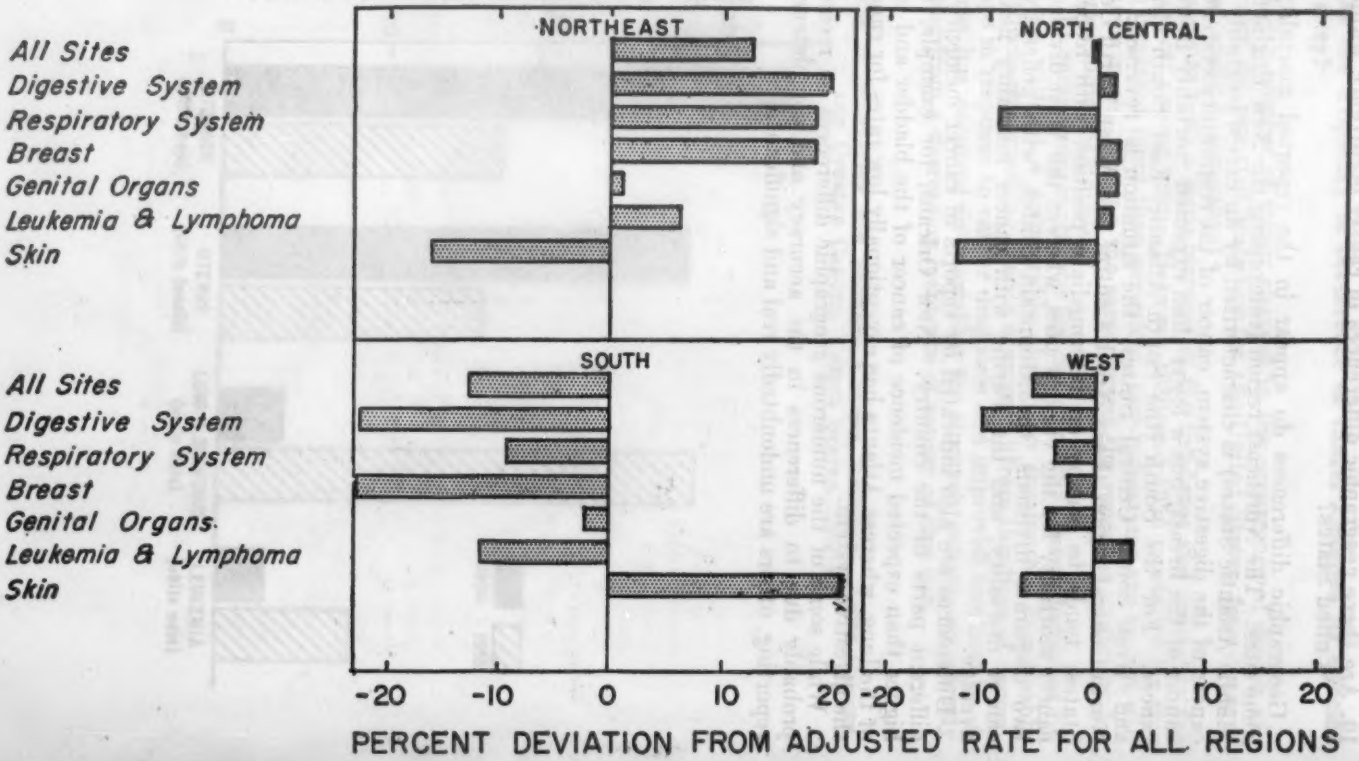
Geographic differences do appear in the reported mortality for some sites. The Northeast region (comprising the New England and Middle Atlantic States) is characterized by an excess mortality from cancer of the digestive system, cancer of the respiratory system, and cancer of the breast, but a lower than expected mortality from skin cancer. For the South (the South Atlantic, East South Central, and West South Central States) the situation is reversed. The North Central region (East North Central and West North Central States) tends to occupy an intermediate position with respect to cancer mortality for the various sites, whereas the West divides into two disparate divisions, the Mountain States, with generally low cancer mortality, and the Pacific with cancer mortality near the average.

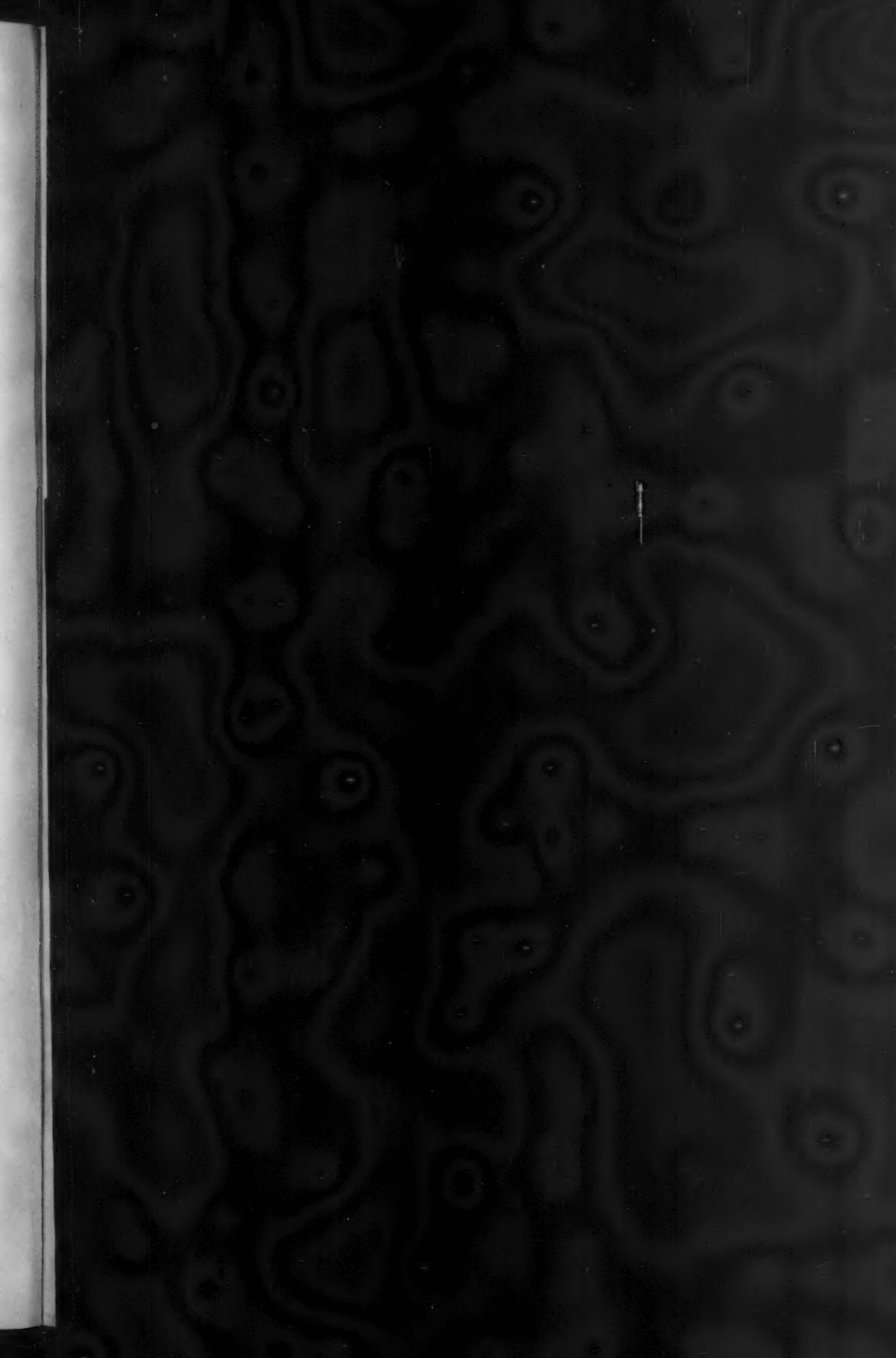
Differences are also indicated by reports of cancer incidence from different parts of the country. New Orleans, for example, has a higher than expected incidence of cancer of the bladder and cancer of the lung, whereas Atlanta has exceptionally low rates for cancer of the digestive system.

While some of the numerous geographic differences on record are probably due to differences in the accuracy and completeness of reporting, others are undoubtedly real and significant.

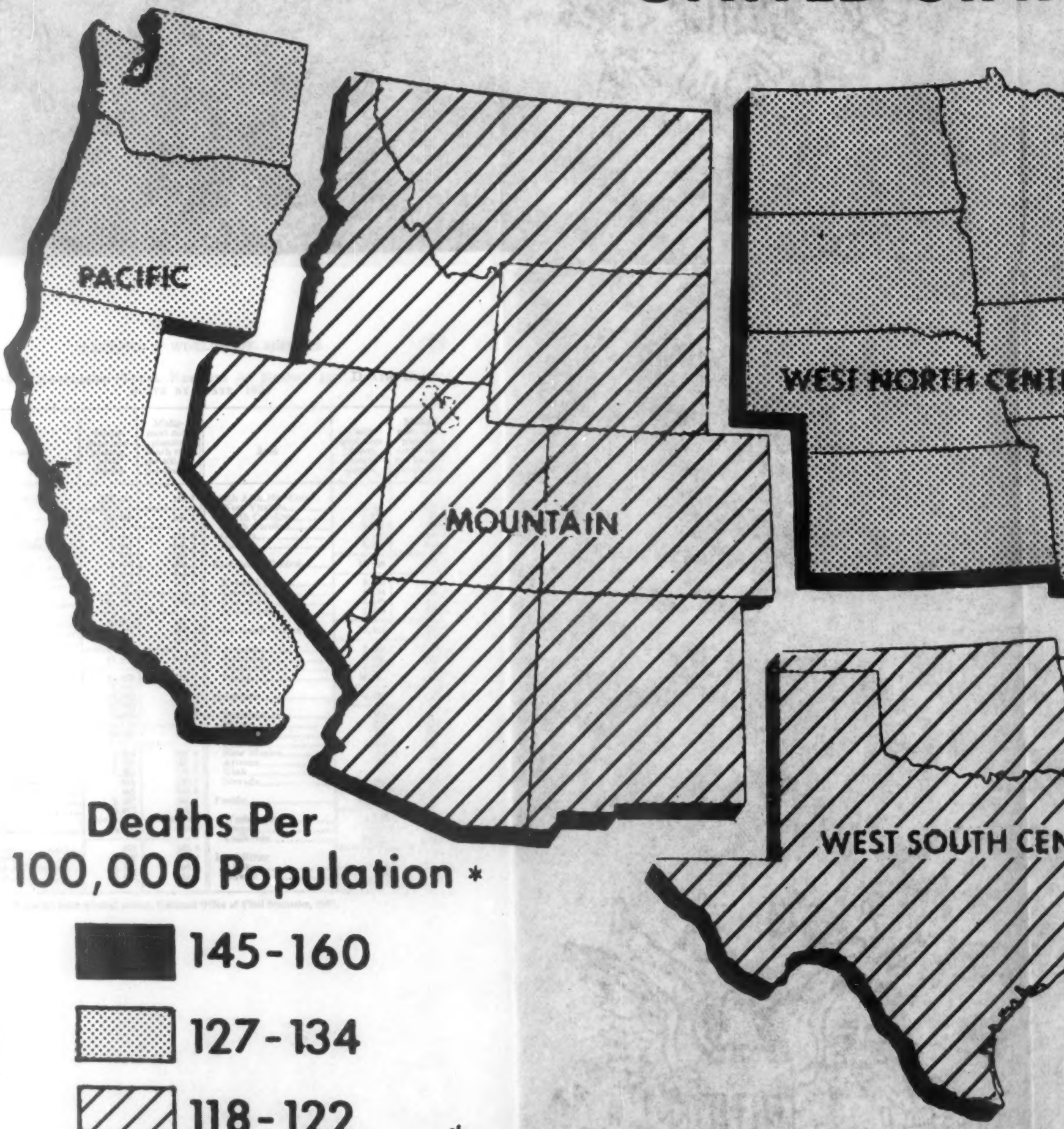


VARIATION IN CANCER MORTALITY BY DIVISION, UNITED STATES, 1949–51





MORTALITY FROM CANCER BY
UNITED STAT



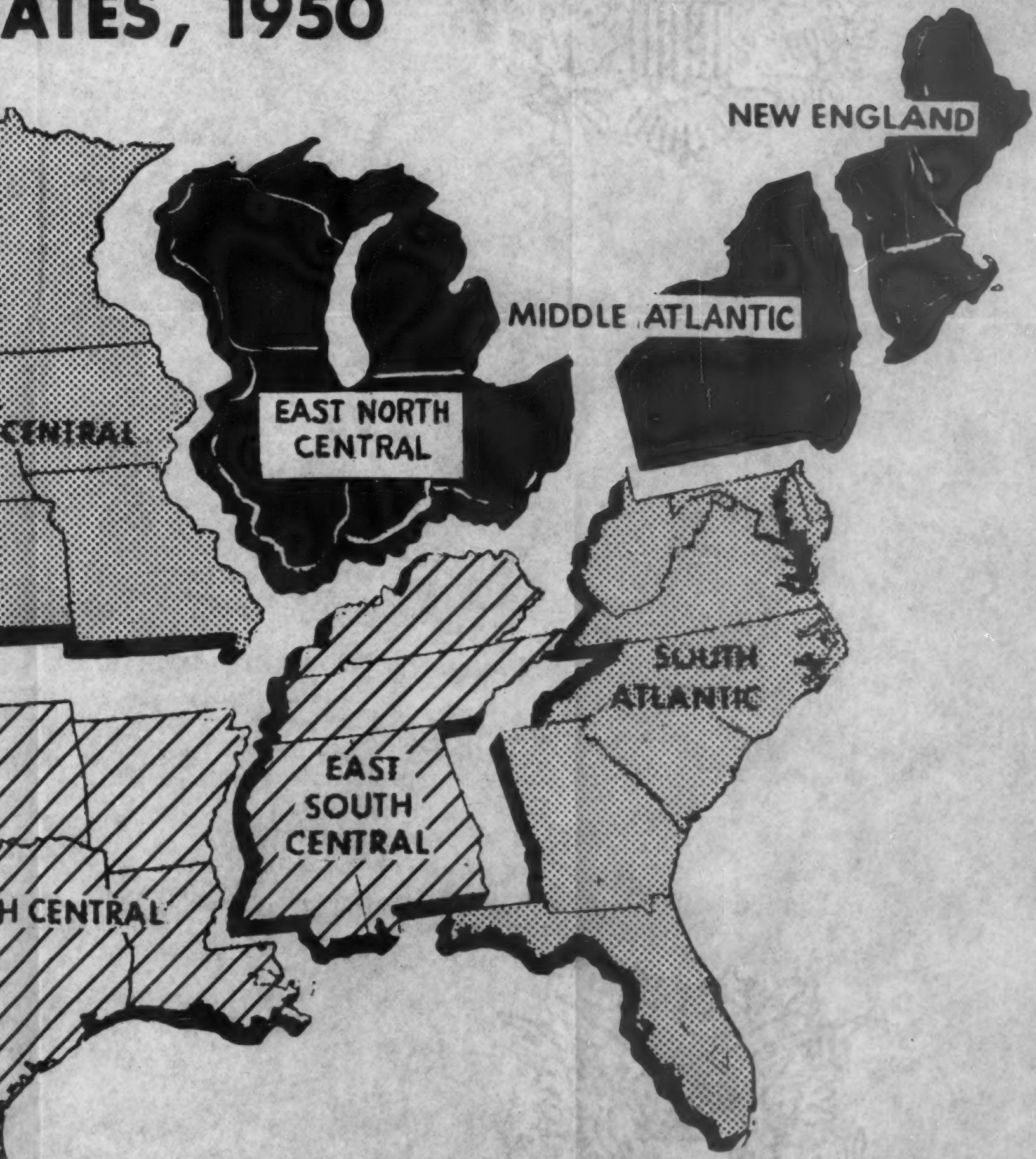
Deaths Per 100,000 Population *

- 145-160
- 127-134
- 118-122

* Adjusted For Age To The U. S. Population

42414 O - 59 (Face p. 12)

BY GEOGRAPHIC DIVISION
ATES, 1950



ation in 1950

AMA News Graphichart
Source : Health Information Foundation

MALIGNANT NEOPLASMS—TOTAL NUMBERS OF DEATHS AND DEATH RATES, STATE BY STATE, 1957

Area	Malignant neoplasms, total deaths	Malignant neoplasms, death rate per 100,000 population
United States	253,183	148.7
New England	18,638	189.5
Maine	1,606	171.0
New Hampshire	1,067	186.2
Vermont	679	183.5
Massachusetts	9,676	200.5
Rhode Island	1,484	173.2
Connecticut	4,126	181.8
Middle Atlantic	59,724	182.2
New York	30,213	187.1
New Jersey	10,477	186.5
Pennsylvania	19,034	172.9
East North Central	54,274	155.2
Ohio	14,520	157.7
Indiana	6,602	146.5
Illinois	16,200	167.0
Michigan	10,790	140.0
Wisconsin	6,162	159.6
West North Central	23,628	155.3
Minnesota	4,904	147.8
Iowa	4,481	161.0
Missouri	7,203	170.0
North Dakota	811	125.7
South Dakota	955	137.8
Nebraska	2,257	157.1
Kansas	3,017	143.7
South Atlantic	29,610	119.6
Delaware	622	143.3
Maryland	4,192	144.8
District of Columbia	1,526	186.1
Virginia	4,419	115.4
West Virginia	2,427	123.6
North Carolina	4,094	91.5
South Carolina	2,134	90.1
Georgia	4,103	108.8
Florida	6,093	144.8
East South Central	13,858	117.3
Kentucky	3,726	122.4
Tennessee	4,134	120.1
Alabama	3,519	111.3
Mississippi	2,479	114.5
West South Central	19,953	122.6
Arkansas	2,300	129.2
Louisiana	3,930	128.2
Oklahoma	3,281	145.4
Texas	10,442	113.8
Mountain	6,794	108.0
Montana	864	128.8
Idaho	679	105.3
Wyoming	331	104.4
Colorado	2,039	122.6
New Mexico	734	90.3
Arizona	1,085	100.6
Utah	773	92.0
Nevada	289	110.3
Pacific	26,704	145.5
Washington	3,922	143.9
Oregon	2,463	141.3
California	20,319	146.4
In addition:		
Alaska	94	44.5
Hawaii	544	88.7

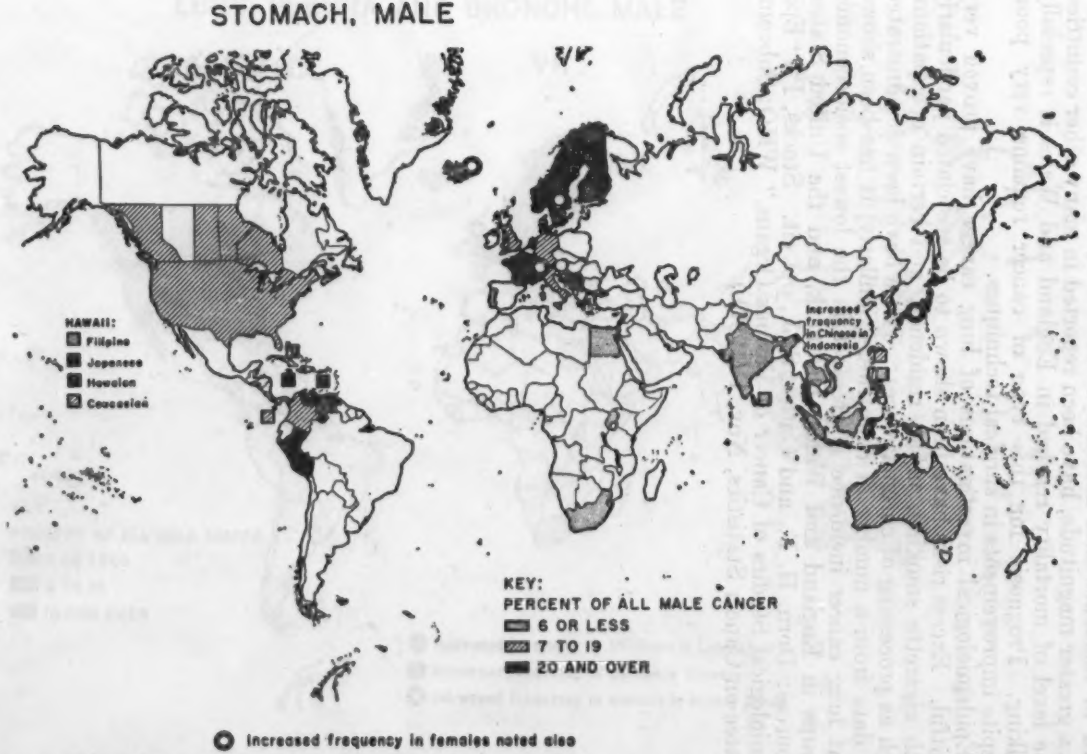
Source: Mortality from selected causes, National Office of Vital Statistics, 1957.

11. What is known about the occurrence of stomach cancer in different countries?

Although a large proportion of cancer deaths in the United States arise from stomach cancer, it is a decreasing cause of death. This change in mortality results from a falling incidence, not from any change in prognosis, and there is no assignable reason for the decrease in incidence.

Geographical differentials for this type of cancer are very striking. Roughly speaking, countries in higher latitudes seem to have a higher stomach cancer mortality. Especially high rates are noted in Japan, where stomach cancer mortality is apparently increasing rather than decreasing. In Latin America, on the contrary, stomach cancer seems to be relatively uncommon.

Epidemiological leads are few. In England and Wales and Denmark stomach cancer incidence is greatest in the lowest socioeconomic groups, least in the highest. In the United States incidence is also inversely related to income level. There is an unusually high incidence of stomach cancer in some occupation groups in England and Wales. A relation of stomach cancer with soil types and diet has also been suggested for some areas in Holland. (Source: Haenszel, W., "Variation in Incidence of and Mortality From Stomach Cancer, With Particular Reference to the United States," Journal National Cancer Institute, vol. 21, pp. 213–262, 1958.)



Source.—Dunham, L. J., and Dorn, H. F., "Techniques in the Geographic Pathology of Cancer." Schweiz. Z. Path. Bakt. 18: 472, 1955. (Transactions of the 5th Meeting of the International Society of Geographical Pathology.)

12. What is known about the occurrence of lung cancer in different countries?

Now the leading cause of cancer death for males in this country, cancer of the lung, pleura, and bronchi has been increasing rapidly both in incidence and mortality. Increases, in some instances of even greater magnitude, have been reported in many other countries. The level of mortality reached in England and Wales is especially striking. Prognosis for this type of cancer remains very poor, despite improvements in surgical techniques.

Epidemiological investigations of lung cancer have proved very fruitful. Excess risks have been shown to be associated particularly with cigarette smoking, urban residence, and certain occupations, such as processing of chromate ores. These have been demonstrated by data from a number of countries. Similarly, it has been shown that lung cancer incidence is greatest in the lowest socioeconomic groups in England and Wales, Denmark, and the United States. (Sources: Dorn, H. F., and Cutler, S. J., op. cit. Stocks, P., "Epidemiological Studies of Cancer of Various Organs," WHO; Subcommittee on Cancer Statistics, Nov. 1 (1957).)

LUNG, PLEURA AND BRONCHI, MALE

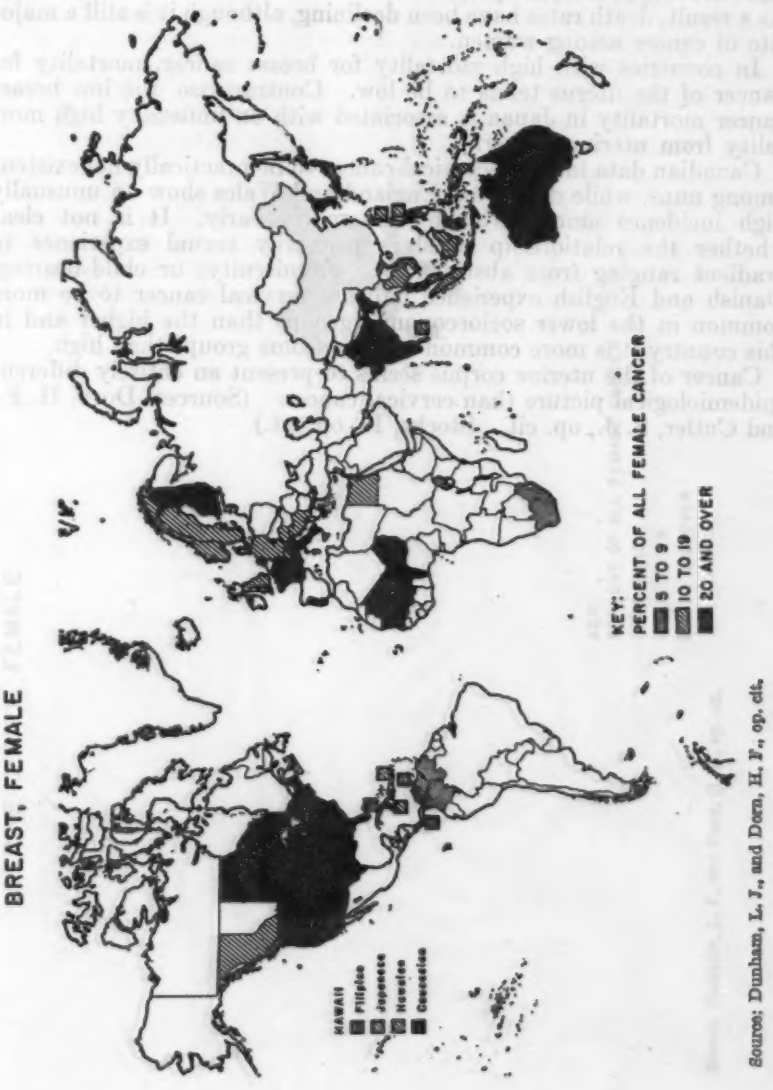
KEY:
PERCENT OF ALL MALE CANCER
5 OR LESS
6 TO 14
15 AND OVER
Increased frequency in Mexicans in Los Angeles
Increased frequency in chromate workers
Increased frequency in workers in mining areas

Source: Dunham, L. J., and Dorn, H. F., op. cit.

13. What is known about the occurrence of breast cancer in different countries?

In this country, the main site of cancer in females is the breast, and during the last 25 or 30 years there has been little change either in incidence or prognosis. A similar situation prevails in many other countries, including Western Europe, Canada, and Australia. A few areas, however, appear to have a much lower incidence—Japan and southeast Asia in particular.

In England and Wales, and Denmark, breast cancer occurs relatively more frequently among women in the higher socioeconomic groups. In this country, a higher than average incidence is also found in high income groups. Studies in England and Wales show that during the childbearing years married women have a lower death rate for breast cancer than unmarried and that married women with children have a lower mortality than those without children. This was also shown in Australia and France. (Sources: Dorn, H. F., and Cutler, S. J., op. cit. Stocks, P., op. cit.)



Source: Dunham, L. J., and Dorn, H. F., op. cit.

14. What is known about the occurrence of uterine cancer in different countries?

While the incidence of uterine cancer in this country has changed little in recent years, the prognosis for this disease has been improving. As a result, death rates have been declining, although it is still a major site of cancer among women.

In countries with high mortality for breast cancer, mortality for cancer of the uterus tends to be low. Contrariwise, the low breast cancer mortality in Japan is associated with an unusually high mortality from uterine cancer.

Canadian data indicate cervical cancer to be practically nonexistent among nuns, while data from England and Wales show an unusually high incidence among women who marry early. It is not clear whether the relationship involves primarily sexual experience (a gradient ranging from abstinence to promiscuity) or child-bearing. Danish and English experience indicate cervical cancer to be more common in the lower socioeconomic groups than the higher and in this country it is more common in low income groups than high.

Cancer of the uterine corpus seems to present an entirely different epidemiological picture than cervical cancer. (Sources: Dorn, H. F., and Cutler, S. J., op. cit. Stocks, P., op. cit.)

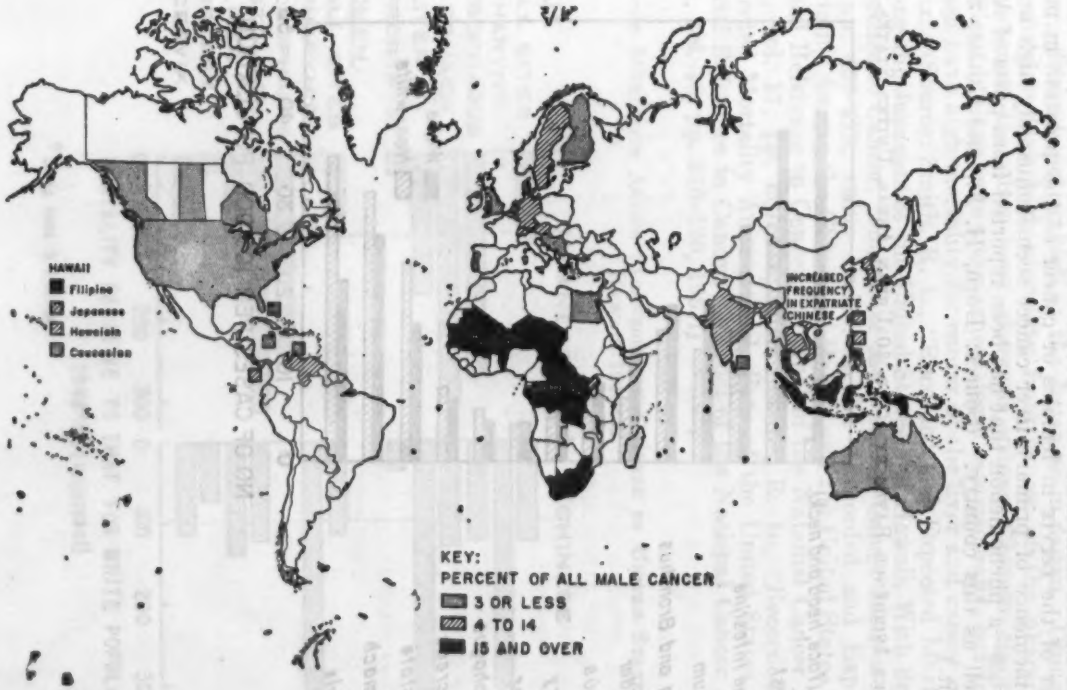
Source: Dunham, L. J., and Dorn, H. F., op. cit.

15. What is known about the occurrence of liver cancer in different countries?

Cancer of the liver and biliary tract is of decreasing importance in the United States and many other countries. While this is largely attributable to a better recognition of other primary cancers, rather than a decrease in the incidence of primary liver cancer, some real decrease may in fact have occurred.

In some parts of Asia, Africa, and Malaya cancer of the liver is one of the most frequent types of cancer observed. In these areas it appears to be associated with certain nutritional deficiencies. Primary liver cancer seems to occur more frequently in areas where chronic malnutrition and, in particular, serious protein deficiency is widespread. Portal cirrhosis of the liver is suspected as a precursor of liver cancer in Europe and America, while in South and West Africa a severe cirrhosis of uncertain origin is implicated. It has also been suggested that certain liver parasites may produce cancer of the liver. (Sources: Dorn, H. F., and Cutler, S. J., op. cit. Stocks, P., op. cit.)

LIVER AND BILIARY TRACT, MALE

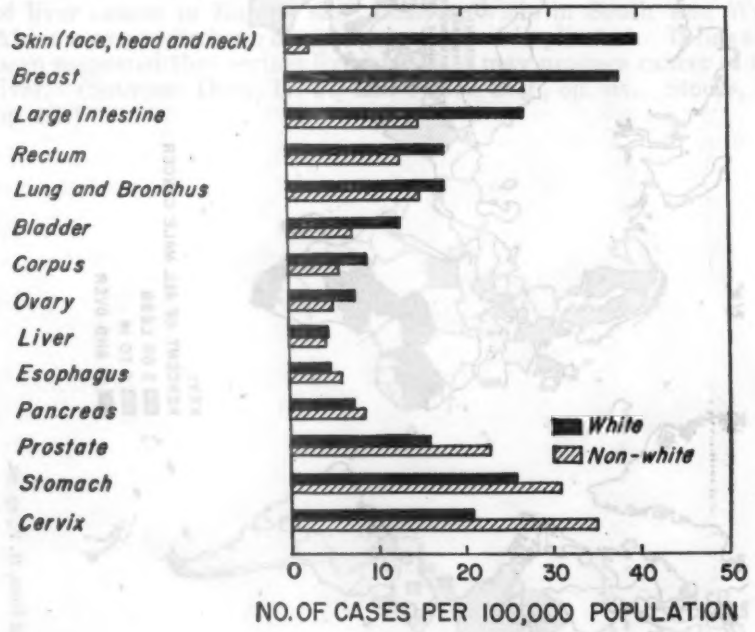


Source: Dunham, L. J., and Dorn, H. F., op. cit.

16. Are there race differences in cancer occurrence?

Differences may be observed between white and nonwhite populations in the United States in the occurrence of cancer. These differences vary greatly by site. Negroes are much less likely to develop cancer of the skin than white people but are more likely to develop cancer of the cervix in females or cancer of the prostate in males. The incidence of primary liver cancer seems unusually high among Negroes—a phenomenon that has been reported from parts of Africa as well as this country. (Source: Dorn, H. F., and Cutler, S. J., op. cit.)

CANCER INCIDENCE RATES BY RACE, 10 URBAN AREAS, UNITED STATES, 1947

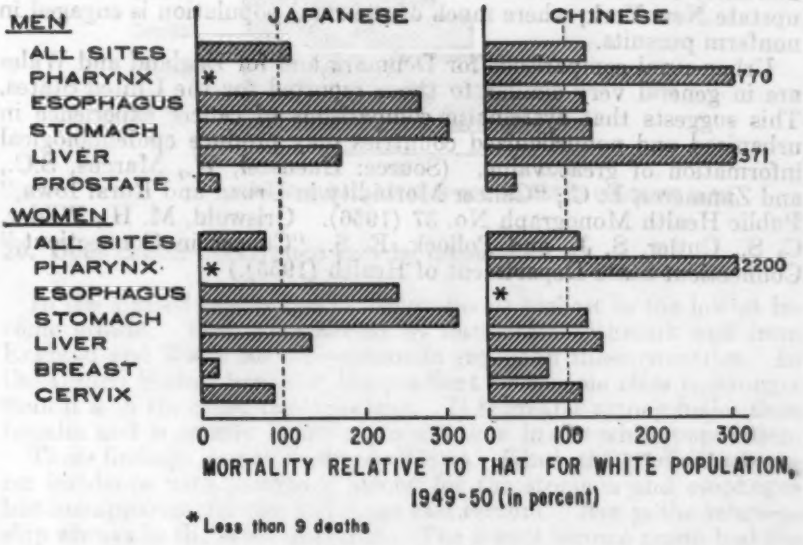


17. What are some unusual features of cancer mortality among specific groups in the United States of varying origins?

Cancer mortality among the Japanese, Chinese, and Indians living in the United States and Hawaii differs from that for the remainder of the population in several respects.

Japanese here have a relatively high risk of developing stomach cancer, although not so high as the Japanese in Japan. Chinese in this country have high mortality from cancer of the pharynx, a phenomenon that has been observed among Chinese elsewhere. American Indians have a low cancer death rate generally, but Indian women have high mortality for cancer of the liver and cancer of the cervix. (Source: Smith, R. L., "Recorded and Expected Mortality Among the Japanese of the United States and Hawaii, With Special Reference to Cancer," Journal of the National Cancer Institute, vol. 17, pp. 459–473, 1956. Smith, R. L., "Recorded and Expected Mortality Among the Chinese of Hawaii and the United States With Special Reference to Cancer," Journal of the National Cancer Institute, vol. 17, pp. 667–676, 1956. Smith, R. L., "Recorded and Expected Mortality Among the Indians of the United States With Special Reference to Cancer," Journal of the National Cancer Institute, vol. 18, pp. 385–396, 1957.)

CANCER MORTALITY AMONG JAPANESE AND CHINESE IN UNITED STATES AND HAWAII, 1949–52



18. How does the occurrence of cancer vary with genetic factors?

For most of the international and racial differences in the occurrence of cancer, data are insufficient to conclude what part of such differences is genetic and what part is attributable to environmental factors such as diet and habits.

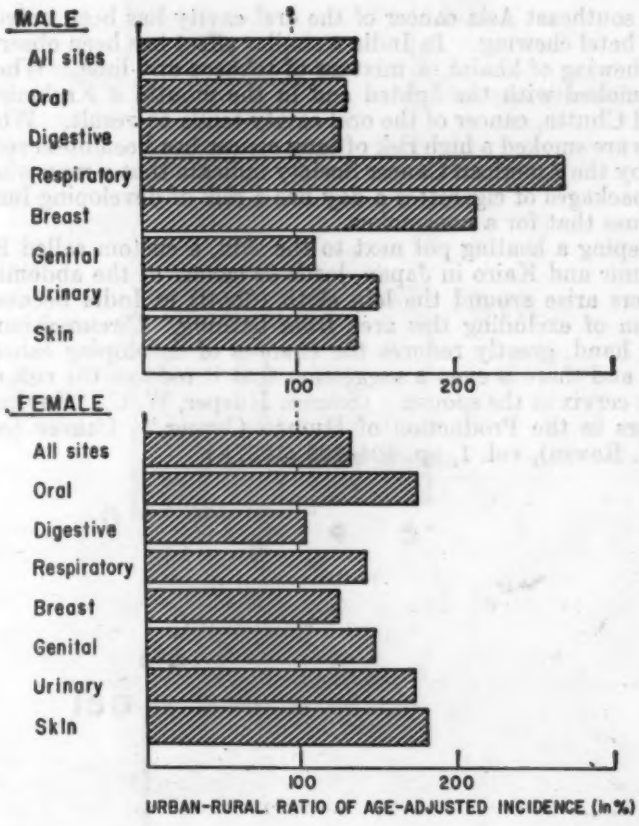
The genetic influence has been studied adequately in but few human neoplasms. A tendency for cases to appear with above-average frequency in certain families has been noted in cancer of the female breast, large intestine, and stomach. One rare form of cancer of the eye, called retinoblastoma, and two disease precursors, familial multiple polyps of the colon and an extreme sensitivity to sunlight in people with a skin condition called xeroderma pigmentosum, are strikingly inheritable. There is also some genetic association between group A and stomach cancer and between mongolism and one form of acute leukemia.

19. Are there urban-rural differences in the occurrence of cancer?

Comparisons of cancer incidence for urban and rural populations in the United States have been reported for Connecticut, Iowa, and upstate New York. Data for each of these areas show a higher urban incidence for each cancer site group. In Iowa, where there is a definite contrast between urban and rural populations, the excess cancer mortality for urban areas is slightly greater than in Connecticut or upstate New York, where much of the rural population is engaged in nonfarm pursuits.

Urban-rural comparisons for Denmark and for England and Wales are in general very similar to those reported for the United States. This suggests that systematic comparisons of cancer experience in urbanized and nonurbanized countries may produce epidemiological information of great value. (Source: Haenszel, W., Marcus, S.C., and Zimmerer, E. C., "Cancer Morbidity in Urban and Rural Iowa," Public Health Monograph No. 37 (1956). Griswold, M. H., Wilder, C. S., Cutler, S. J., and Pollock, E. S., "Cancer in Connecticut," Connecticut State Department of Health (1955).)

CANCER INCIDENCE RATES IN URBAN AS COMPARED TO RURAL AREAS, IOWA, 1950



20. Does cancer occurrence vary by income?

In the United States cancer occurrence is highest in the lowest income groups. This is paralleled by data from Denmark and from England and Wales for socioeconomic groups in these countries. In the United States, however, the gradient by income class is stronger than it is in the other two countries. It is greater among males than females and is greater in the nonwhite than in the white population.

These findings do not apply to all sites. Thus, the gradient of cancer incidence with income is strong for the stomach and esophagus but nonapparent for the intestines and rectum. Nor is the relationship always in the same direction. The lowest income group had the highest incidence for cancers of the buccal cavity and respiratory system but the lowest for cancer of the breast. (Source: Dorn, H. F., and Cutler, S. J., op. cit.)

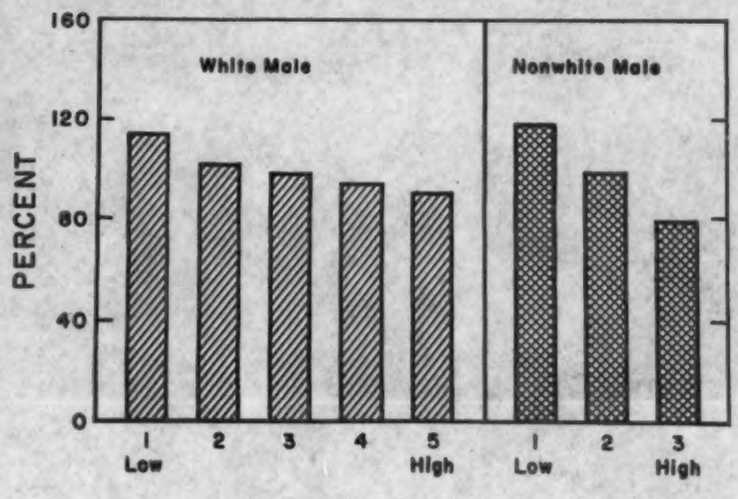
21. What cancers are known to arise from special habits or customs?

In southeast Asia cancer of the oral cavity has been noted to arise from betel chewing. In India a similar effect has been observed from the chewing of khaini, a mixture of tobacco and lime. Where cigars are smoked with the lighted end in the mouth, a Kashmiri custom called Chutta, cancer of the oral cavity tends to result. Where cigarettes are smoked a high risk of lung cancer has been observed. Findings by the American Cancer Society indicate that a man who smokes two packages of cigarettes a day has a risk of developing lung cancer 60 times that for a nonsmoker.

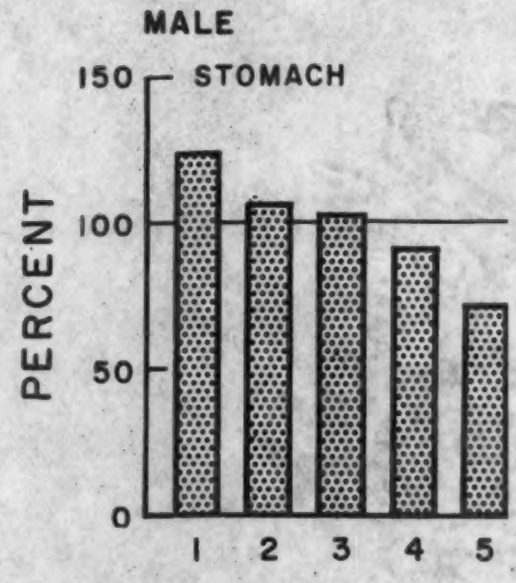
Keeping a heating pot next to the skin, a custom called Kangri in Kashmir and Kairo in Japan, leads to cancer of the abdominal skin. Cancers arise around the loin cloth (dhoti) in India because of the custom of excluding this area from bathing. Circumcision, on the other hand, greatly reduces the chances of developing cancer of the penis and there is even a suggestion that it reduces the risk of cancer of the cervix in the spouse. (Source: Hueper, W. C., "Environmental Factors in the Production of Human Cancer." Cancer (edited by R. W. Raven), vol. 1, pp. 404–496 (1957).)

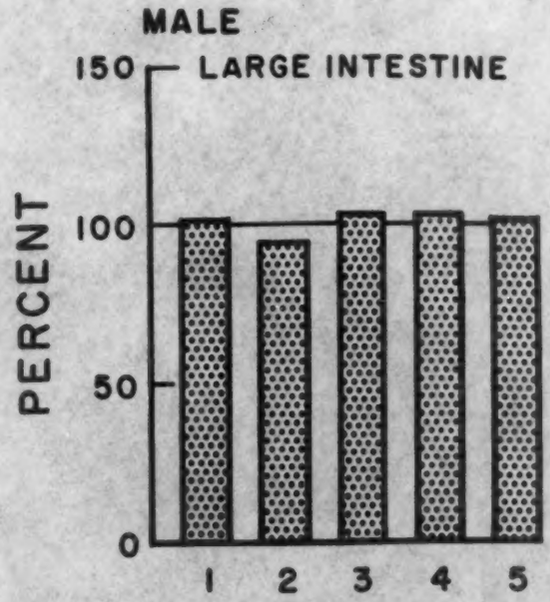
Standard ratios of cancer incidence by incom

(1–5—representing lowest



ALL
SITE



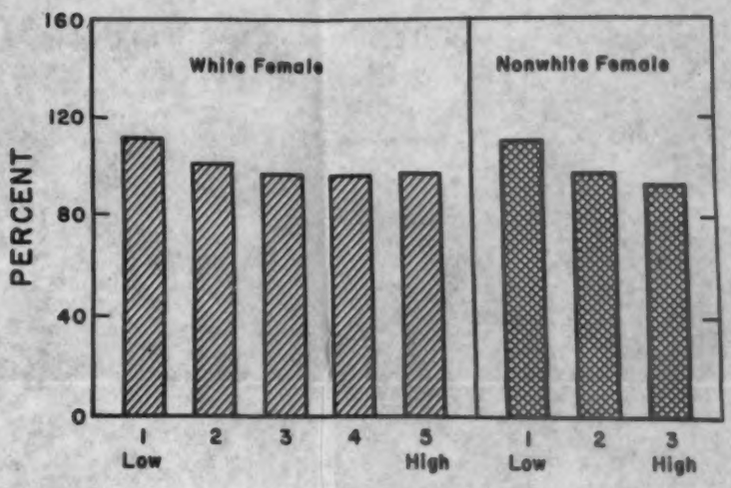


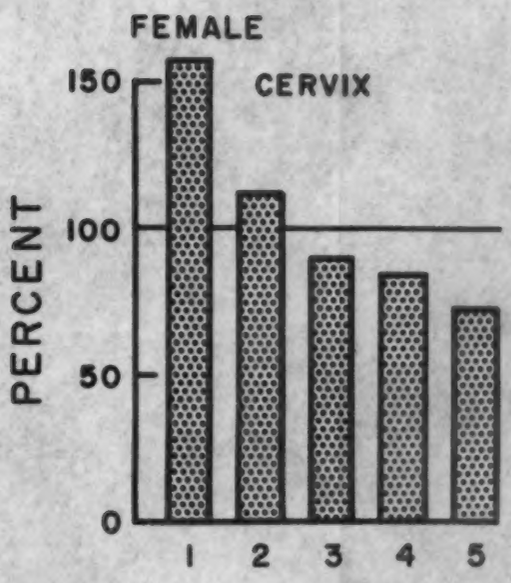
42414 O - 59 (Face p. 28)

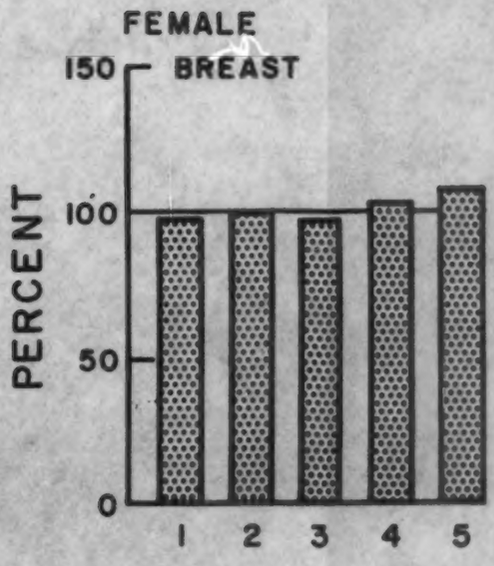
y income classes in 10 cities, United States, 1947

ing lowest to highest income levels)

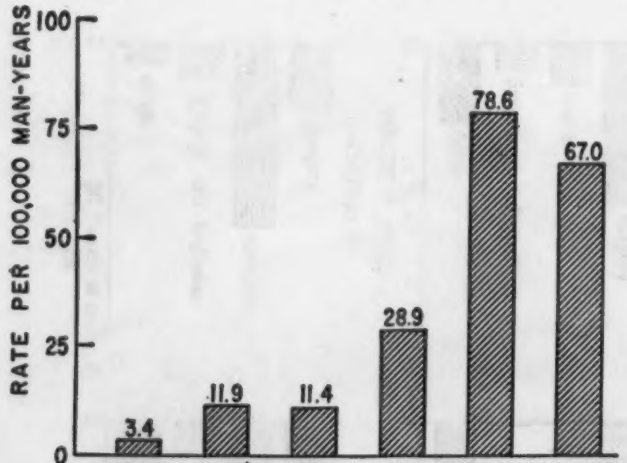
ALL SITES





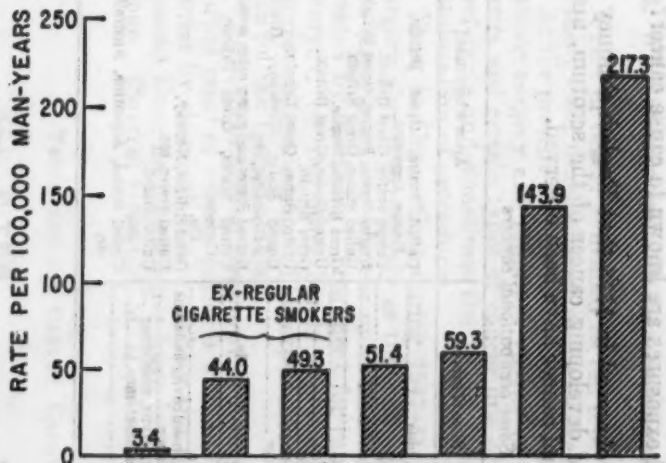


Lung Cancer Mortality by Smoking History



NO. DEATHS	4	5	6	13	162	103
NO. MEN	32,392	11,703	14,483	12,109	63,632	44,136

RATES BY TYPE OF SMOKING AS CLASSIFIED FROM LIFETIME HISTORY



NO. DEATHS	4	15	2	13	50	60	22
NO. MEN	32,392	10,095	1,322	7,647	26,370	14,292	3,100

RATES BY CURRENT AMOUNT OF CIGARETTE SMOKING

Source: American Cancer Society, CA, Bulletin of Cancer Progress, vol. 8, p. 43 (March-April) 1958.

22. What occupational exposures are known to cause cancer?

Since Percival Pott observed in 1775 that English chimney sweeps had an unusual risk of developing cancer of the scrotum, numerous instances of occupational cancer have been observed.

Some occupational cancers

Agent	Sites of cancer	Areas where noted
Arsenic	Skin, lung	United States, Great Britain, Germany, France, Argentina.
Coal tar, pitch	do	United States, Great Britain.
Petroleum	do	United States, France, Great Britain, Austria.
Shale oils	Skin	United States, Great Britain.
Lignite tar and paraffin	do	Great Britain, France.
Creosote oil	do	United States, Great Britain.
Anthracene oil	do	Great Britain.
Soot carbon black	do	United States, Great Britain.
Aromatic amines	Bladder	United States, Germany, Great Britain, Switzerland, etc.
X-rays and radium	Skin, lung, leukemia	United States and many other areas.
Asbestos	Lung	United States, Great Britain, Germany, Canada.
Chromates	do	Do.
Nickel	Lung, nasal cavity and sinus	Great Britain, Norway.
Benzol	Leukemia	United States, etc.
Isopropyl oil	Lung, larynx, nasal sinus	United States.
Radioactive chemicals	Bones, nasal sinus	Do.
Sunlight	Skin	United States, Argentina, Australia, France, etc.

Source: Hueper, W. C., op. cit.

23. What are the methods for treating cancer?

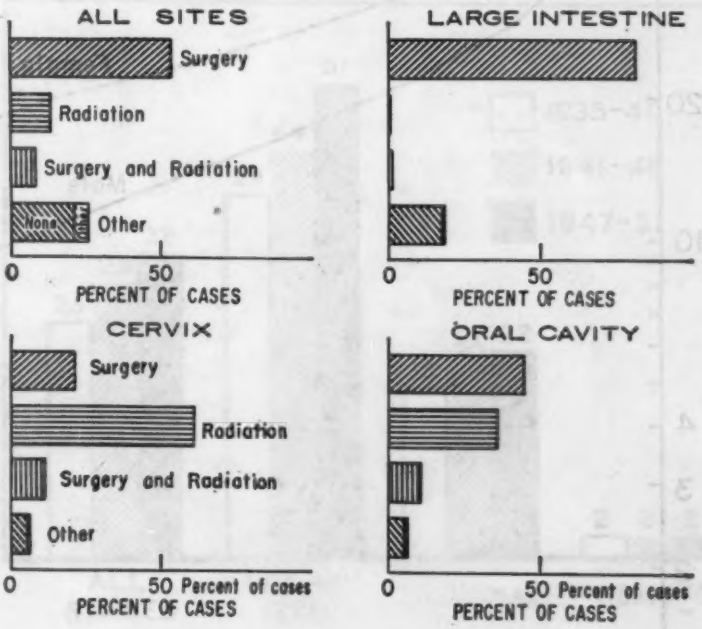
A *cure* of cancer is defined as the total and permanent eradication of the disease, usually based on disease-free survival for at least 5 years.

At the present time there are only two *curative* methods for treating cancer: surgery and radiation (X-ray or radium). For certain patients and certain types of cancer one or the other method may be preferable and sometimes the best results are obtained by using a combination of procedures.

Thus, in Connecticut during 1947–51, it was the practice to use surgery almost exclusively as the method of treatment for cancer of the large intestine, whereas most cases of cancer of the cervix were treated by radiation. Treatment for cancers of the oral cavity and pharynx, on the other hand, was almost evenly divided between surgery and radiation. This experience is probably fairly representative for the United States.

Chemotherapy (the treatment of cancer by drugs) is used for the partial relief of certain patients with advanced cancer. The *cure* of cancer by chemicals is one of the major research goals, but up to the present time, no actual cures have been obtained by chemotherapy alone. (Source: Griswold, M. H., et al., op. cit.)

TREATMENT FOR CANCER: CONNECTICUT, 1947–51

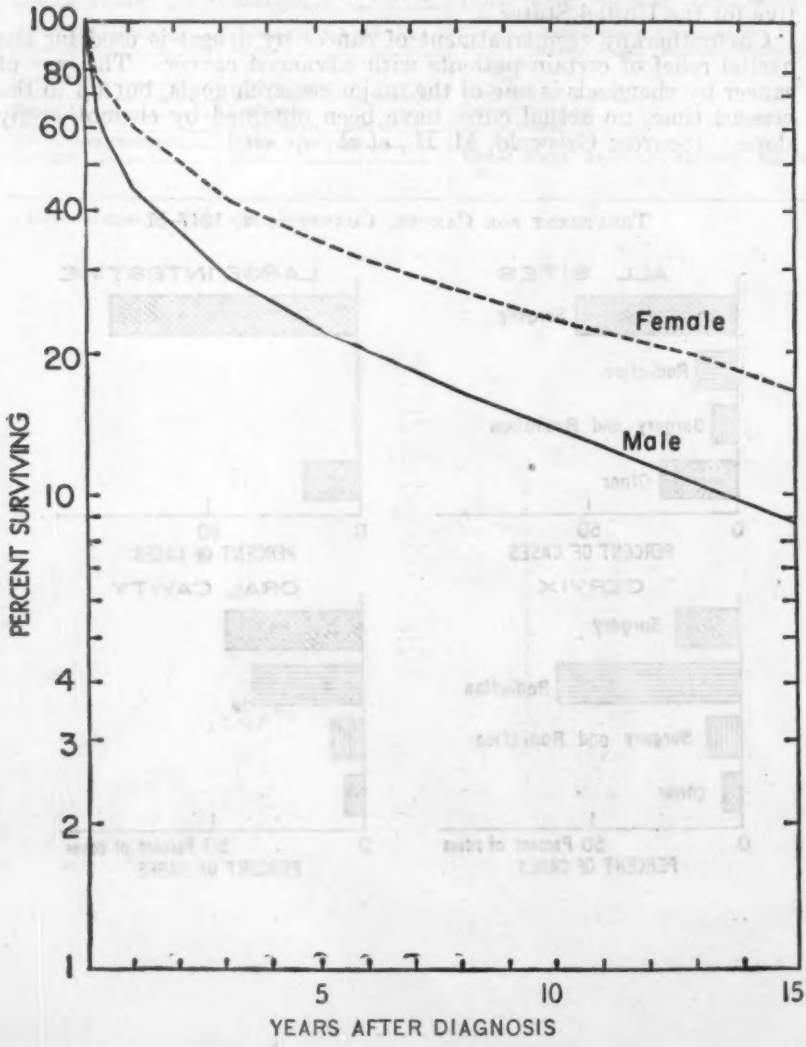


24. What are the survival prospects for cancer patients?

Some 22.4 percent of the men developing cancer and 34.1 percent of the women survive 5 years after diagnosis. These findings are based on cancer cases diagnosed in Connecticut between 1935 and 1951 and are probably representative for the United States as a whole.

Survival varies according to several factors. The site of the cancer is one. Cancer of the skin has an excellent prognosis; 5-year survival is 64.2 percent for men and 70.9 percent for women. Cancer of the stomach has a bad prognosis; less than 6 percent survive 5 years. The chances of survival also depends on how advanced the cancer is when discovered. Prognosis is much better if the cancer is still localized at the original site than if it has spread far beyond the primary site. (Source: Griswold, M. H., et al., op. cit.)

CANCER SURVIVAL, CONNECTICUT, 1935–51

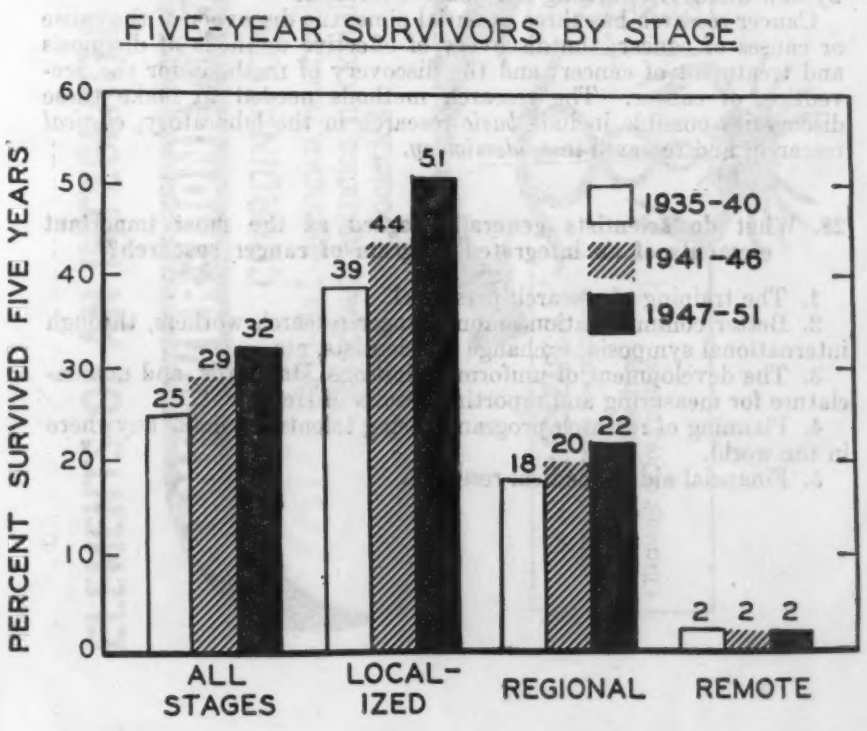


25. Have survival prospects for cancer patients improved in this country?

During the period 1935–40, 24 percent of the men diagnosed as having cancer in the State of Connecticut, and 34 percent of the women, survived 5 years. By 1947–51, the percentages had risen to 32 and 45 percent, respectively. These changes reflect improvements in survival for localized cancer and, to a lesser degree, for cancer spread regionally to adjacent tissues. The chances of survival when the cancer has already spread to more remote parts of the body remain at a very low level.

Improvements in survival occurred for some sites but not for others. The chief improvements were for cancers of the large intestine and rectum and cancer of the uterus. For sites like the stomach and lung no improvement in survival was indicated.

While these data derive from one State only, it may be presumed that similar improvements in survival prospects have occurred elsewhere in the United States, as well as in other western countries. (Source: Shimkin, M. B., Griswold, M. H., and Cutler, S. J., "Survival in Untreated and Treated Cancer," Annals of Internal Medicine, vol. 45, pp. 255–267 (1956).)



SOURCE: CONNECTICUT STATE DEPARTMENT OF HEALTH.

26. What is the economic cost of cancer?

The economic loss to society due to cancer is heavy. The cost to the individual family is often catastrophic. Many of the more than 450,000 persons diagnosed each year as having cancer will cease to be productive members of society. This represents a tremendous loss of income to the families affected at the very time that expenses mount, because the disease has struck. The loss of productiveness, particularly on the part of a breadwinner, causes serious disruption of the family's economy. It has been estimated that the economic burden of cancer to society amounts to about $12 billion a year.

27. What are the prospects of reducing the toll from cancer?

Part of the cancer toll could be reduced by a full exploitation of presently available knowledge. It is estimated that about 50 percent of all cancer patients could be salvaged with the application of present methods of early diagnosis and intensive treatment, if these would be systematically applied to all patients.

This, however, leaves a tragic residual which can only be helped by new discoveries arising from cancer research.

Cancer research has three essential aims: the discovery of the cause or causes of cancer; the discovery of effective methods of diagnosis and treatment of cancer; and the discovery of methods for the prevention of cancer. The research methods needed to make these discoveries possible include *basic* research in the laboratory, *clinical* research, and research in *epidemiology*.

28. What do scientists generally regard as the most important elements of an integrated program of cancer research?

1. The training of research personnel.
2. Better communication among cancer research workers, through international symposia, exchange of scientists, etc.
3. The development of uniform definitions, standards, and nomenclature for measuring and reporting results of treatment.
4. Planning of research programs, using talents available anywhere in the world.
5. Financial aid to medical research.

ELEMENTS OF AN INTEGRATED CANCER PROGRAM
MANPOWER • MONEY • FACILITIES
COORDINATION
Official agencies, national and local
Voluntary agencies, national and local
Professional societies
CANCER RESEARCH
• Support of research investigations
• Facilities
• Training and fellowships
• Exchange of information
CANCER CONTROL
• Program planning and evaluation
• Services
• Detection Centers
• Diagnostic Clinics
• Statistics
• Education, lay and professional

29. What are the resources available for supporting the fight against cancer in the United States?

A variety of resources are available for the national effort against cancer. The National Cancer Institute of the U.S. Public Health Service conducts research in cancer, fosters research by others and promotes "* * * the coordination of all such researches and activities and the useful application of their results * * *", with the assistance of other Federal agencies, such as the Atomic Energy Commission.

Cooperating in this program is the American Cancer Society, the leading voluntary agency working against cancer. It also provides funds for research, and in addition engages in an extensive program of public education. It supports detection programs and diagnostic and treatment services and serves as the focus for voluntary activities.

The American Association for Cancer Research, representing professional groups, also participates in the effort against cancer, as do State and local health departments, universities, pharmaceutical houses, hospitals, etc.

Research is international and contributions toward the effort against cancer are made by scientists from all countries. To answer the many questions about cancer as quickly as possible all the skills available anywhere must be enlisted.

THE NATIONAL EFFORT IN CANCER
Official Government Agencies
National Cancer Institute
AEC, State Health Departments
Professional Societies
(Technical Leadership)
• American Association for Cancer Research
• American College of Surgeons
• American College of Radiologists
• College of American Pathologists
Etc.
Voluntary Public and Private Agencies
• American Cancer Society
• Damon Runyon Memorial Fund for Cancer Research
• Local endowed institutions
Etc.
CANCER CONTROL
• Services
• Statistics
• Education, lay and professional
• Detection Centers
• Rehabilitation Clinics
CANCER RESEARCH
• Support of research investigations
• Facilities
• Training and fellowships
• Exchange of information

30. What are the present international resources for the study of cancer?

The World Health Organization acts as the focus of international efforts in health. It maintains liaison with the voluntary international health organizations through the Council for International Organizations of Medical Sciences. Chief of the voluntary international organizations in cancer research is the International Union Against Cancer and its International Cancer Research Commission which has assisted in the coordination of international efforts in cancer research for many years. Other health agencies have also helped in this effort; in particular, the International Society of Geographic Pathology has sponsored valuable symposia on cancer. In addition, the various specialized agencies of the United Nations may be called upon for advice and assistance in their respective areas when problems such as occupational cancer or food additives are under consideration.

INTERNATIONAL EFFORT IN CANCER
Advisory Agencies
WHO
Council for International Organizations of Medical Sciences
International Union Against Cancer
CANCER RESEARCH
• International meetings
• Interchange of Research workers
• Development of standards, nomenclature
CANCER CONTROL
• Pooling and exchange of information and experience
• Public education

31. What areas of cancer research lend themselves particularly to an international approach?

1. *Epidemiology.*—There are marked differences between countries in the occurrence of various forms of cancer. There are also marked differences in the exposure to suspected cancer-causing agents. This presents unique opportunities in the search for cancer causes.

2. *Industrial and occupational cancers.*—Exchange of information on known cancer hazards and pooling of experience on suspected hazards can benefit all concerned.

3. *Foods and drugs.*—The cancer risks from food additives and certain drugs and cosmetics are very difficult to measure. Pooling experience from many countries can make this job easier.

4. *Air pollution.*—While air pollution is a problem in many countries the pollutants differ from place to place, and so do the risks from different types of cancer. This may prove helpful in determining which pollutants are carcinogenic.

5. *Tumors of domestic animals.*—This is both an economic problem for many countries and an opportunity for international research into the causes of cancer.

6. *Cancer therapy.*—Cooperative international arrangements can speed results in this area through testing different forms of treatment and comparing end results as well as through screening anticancer agents. Some significant steps in the direction of international cooperation are being developed under the program of the Cancer Chemotherapy National Service Center.

○